

CHAPTER 5

RESCUE AND SURVIVAL EQUIPMENT

Learning Objective: Upon completion of this chapter, you will be able to recognize, inspect, and maintain survival items and rescue equipment.

When an aircrewman has to leave his aircraft in a hostile environment, survival items provide a means of sustaining life, attracting the attention of rescuers, and aid in evading the enemy. Survival items may be packed in life rafts, droppable kits, and kits intended to be carried or worn by the aircrewman.

As an Aircrew Survival Equipmentman, your responsibility to the aircrewman is to maintain these survival items. You need to know how they work and be able to pass that information on to the aircrewman.

Many of the items that are frequently carried by the aircrewman are discussed in the following text. The ones that are not covered in this chapter are described in the NAVAIR 13-1-6.5 manual.

SIGNALING EQUIPMENT AND DEVICES

The following items are used to attract the attention of a rescue team. With the proper knowledge, ability, and caution, these items can provide invaluable assistance in a survival situation.

DYE MARKER

The dye marker (fig. 5-1) is an aniline dye powder in a sealed container. When placed in the water, it produces a bright color that appears orange or fluorescent green depending on how the light strikes it. It is used to attract the attention of rescue aircraft. The dye is exhausted from the package in 20 to 30 minutes and ceases to be a good target after 1 hour. The dye-exposed water



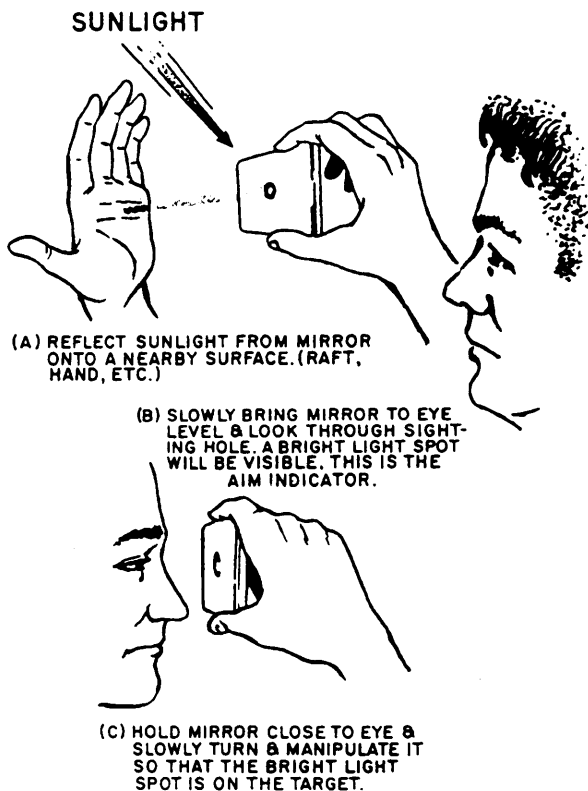
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Figure 5-1.—Dye marker.

area is visible at an approximate distance of 10 miles from an altitude of 3,000 feet. If rapid dispersion of the dye is desired, agitate the packet of dye vigorously in the water.

SIGNALING MIRROR

The emergency signaling mirror is approximately 3 by 5 inches and consists of an aluminized reflecting glass mirror, a back cover glass, and a sighting device. It is used by personnel in rafts or on land to attract the attention of passing aircraft or ships by reflection, either in sunlight or in hazy weather. The reflections of this shatterproof mirror can be seen at a distance 3 to 5 times as great as those from which a raft can be sighted at sea. On a clear sunny day, the mirror



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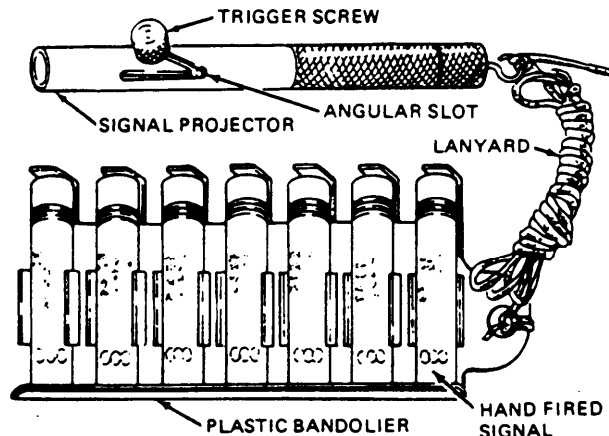
Figure 5-2.—Operation of the signaling mirror.

reflects the equivalent of 8 million candlepower. Flashes from the mirror have been seen from a distance of 40 miles. A smaller mirror, measuring 2 by 3 inches, is also used in some kits.

Figure 5-2 shows the operation of the signaling mirror. Past experience indicates that personnel may have difficulty using the mirror in a bobbing raft at sea. Signaling practice with the mirror should be encouraged as part of the training program for flight crews. Such practice reduces the difficulty in case of emergencies. Before using the mirror, read the instructions printed on its back.

MK 79, MOD 0 ILLUMINATION SIGNAL KIT

The Mk 79 signal kit is supplied with one pencil-type launcher (Mk 31), seven Mk 80 screw-in cartridges, and a bandolier for storing the flares until use. Protective caps should be used over the primers of the cartridges when not using the bandolier.



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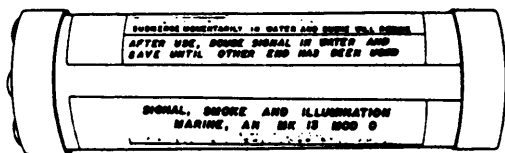
Figure 5-3.—Mk 79 Mod 0 illumination signal kit.

Each cartridge flare has a minimum duration of 4 1/2 seconds and can be launched up to 250 feet. When the launcher is stored in the survival vest, it should be in the COCKED position and empty (fig. 5-3). Refer to NAVAIR 11-15-7 for proper handling and storage of the signal kit.

MK 13, MOD 0 SIGNAL FLARE

The Mk 13, Mod 0 signal flare is intended to attract the attention of SAR aircraft and to give them drift direction. To avoid being burned by sparks, the ignited Mk 13, Mod 0 signal must be held at arms length and no more than shoulder high. If the Mk 13, Mod 0 signal is being used at sea, hold it over the side of the life raft to prevent damage to the life raft from hot residue. The Mk 13, Mod 0 signal may be put out by dousing in water or snuffing in sand. Refer to NAVAIR 11-15-7 for precautions, handling, and storage procedures.

The Mk 13, Mod 0 consists of a metal cylinder closed at each end. There is a tear friction tape igniter on a clip at each end. One end contains a red flare for nighttime use; the opposite end houses an orange smoke signal for daytime use. Each end of the signal burns approximately 20 seconds. The nighttime end of the flare has protrusions that you can feel in the dark. On the outside of the Mk 13, Mod 0 flare are operating instructions and a lot number (fig. 5-4). The lot number should be checked each time the flare is inspected to ensure that the flare is still serviceable. A list of lot numbers that are not serviceable can be found in current aircrew



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Figure 5-4.—Mk 13 Mod 0 marine smoke and illumination signal.

equipment bulletins. Any flares manufactured before 1960 should also be removed from service.

DISTRESS LIGHT (SDU-5/E)

The SDU-5/E light equips aircrew members and shipboard personnel with a high-intensity visual distress signal. The infrared filter and blue flash guard, contained in the SRU-31/P survival kit, are used in conjunction with the SDU-5/E light for signaling purposes in combat areas.

The SDU-5/E is commonly called a strobe light. It emits a high-intensity flashing light. This light is visible for great distances at night.

The SDU-5/E strobe light requires an inspection by the PR each time the aircrewman's flight gear is inspected (every 90 days). The aircrewman should perform a daily inspection to ensure that the light is operative. The calendar inspection consists of activating the light for 2 minutes. If the light does not operate at 50 flashes per minute (plus or minus 10 flashes) for the 2-minute duration, replace the battery. Repeat the procedure; if the light still does not operate, remove the light from service.

You must perform this test both in total darkness and also in a lighted area. Some lights operate in a lighted area but do not operate in TOTAL darkness.

You should store the batteries for the SDU-5/E light in a cold area (refrigerator) to prolong their service life and dependability.

To avoid causing possible night blindness to the crewman by accidental activation, install the SDU-5/E light in the SV-2 survival vest with the dome down and a protective cap installed over the switch.

INDIVIDUAL AIRCREWMAN'S SURVIVAL KIT (SRU-31/P)

The complete SRU-31/P kit consists of two parts; the first packet contains medical items that

an aircrewman might need in an emergency situation. The local medical department has responsibility for the medical items that are contained in packet number one.

Packet number two contains general survival items. They are also intended to be used only in an emergency situation.

Packet one and packet two are contained in a carrying bag. Each packet can be replaced individually. Each item within a packet is packed in a transparent bag, which is hermetically sealed and retained in place by means of hook-and-pile tape. Additional adhesive-backed discs of hook-and-pile tape are contained in the spare pocket of each container.

MEDICAL PACKET

The following items are contained in the medical packet of the SRU-31/P kit:

Soap. Nonperfumed, intended to avoid detection.

Instruction card. Provides general condensed instructions on use of survival items.

Antidiarrhea tablets. Dosage rates listed on instruction card. Expiration 4 years.

Pain killer (aspirin). Expiration date listed on foil packet. Replace as required. Dosage rate listed on instruction card.

Band-Aids.

Surgical tape. Ensure the package is intact and its sterile seal is not damaged.

Eye ointment. Expiration date of 5 years.

Water purification tablets. Manufacturer's date and applicable instructions listed on bottle.

Bandage (elastic). Ensure package is intact and sterile seal is not damaged.

Insect repellent.

GENERAL PACKET

The following items are contained in the General Packet of the SRU-3/P kit:

Metal matches. These may cause spontaneous ignition through oxidation. The match should remain in its original sealed container (foil wrapped) until ready for use. All metal matches in polyethylene and open packets must be removed from service and discarded in a fireproof container.

Mirror. This is the signaling mirror described at the beginning of this chapter.

Water bag. One-quart capacity. Belt loops provided for convenient carrying.

Signal panel. Silver/orange paulin, imprinted with the ground-to-air emergency code. It also may be used as a blanket for protection against unfavorable weather.

Mosquito headnet and mittens. Provided for protection against insect bites.

Chiclets. Multi-flavored gum, designed to relieve tension.

Multiflavored candy. Service shelf life is indefinite.

Flash guards. The flash guards are used in conjunction with the SDU-5/E light as a signal device during rescue operations. The flash guards are blue or red in color.

The packet also contains surgical tape, a water receptacle, wrist compass, razor knife, tweezers, and pins.

INSPECTION

You should inspect all the items in the SRU-31/P survival kit during periodic equipment inspections and replace them as necessary.

RATIONS

The rations carried by aircrew personnel are not intended for subsistence but as a source of quick energy when no other food is available.

The food packet contains two packets of candy and gum, twine, and an instruction sheet.



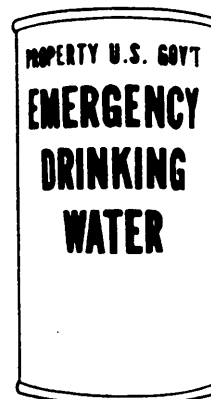
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Figure 5-5.—Rations.

When you inspect any item that contains these rations, you should remove and replace any food packet that is older than 6 1/2 years (fig. 5-5).

CANNED DRINKING WATER

Canned drinking water (fig. 5-6) is intended for use in emergencies when no other clean water



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Figure 5-6.—Canned drinking water.

is available. One can of water supports a survivor for about 1 day.

A can of drinking water contains 10 ounces of pure drinking water and maybe carried in this ready-to-use state.

The canned drinking water should be inspected upon issue and every 90 days thereafter, or at intervals to coincide with the inspection schedule of the kit or assembly in which the can is stored. Inspection will consist of the slap test and the shelf life and service life check.

The slap test consists of slapping the can of water against the palm of your hand and listening for a sharp metallic click. This noise is caused by the absence of air to cushion the impact of the water against the can. If this distinct noise is not heard, then air has leaked into the can and it should be replaced.

The shelf life and the service life of canned water are both indefinite as long as the cans pass the slap test and there are no signs of exterior deterioration.

SURVIVAL RADIOS AND BEACONS

Today's rescue procedures are based upon early detection and fast recovery of the surviving aircrewman. Once an aircrewman has been placed into a survival position, it is essential that he be located as soon as possible. The one item that can accomplish this is the survival radio.

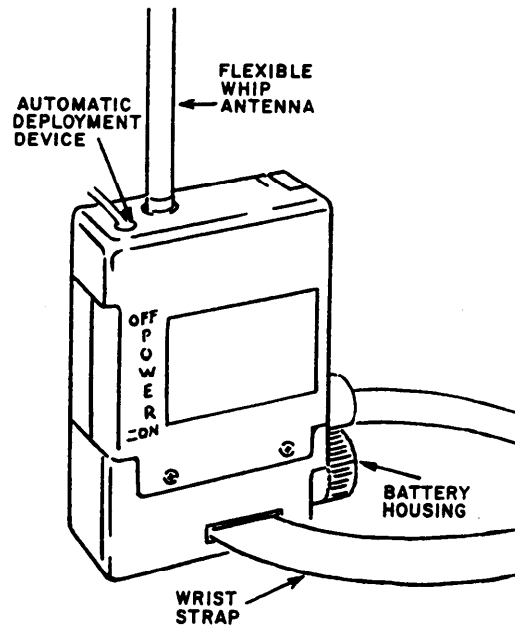
Navy aircrewmen carry, as part of their personal survival equipment, a two-way communication radio. This radio is either the AN/PRC-63 or the AN/PRC-90. You must check each aircrewman's radio when you perform the 90-day calendar inspection on his survival equipment.

This chapter describes the operation and inspection of these radios. It also covers the AN/URT-33A and the AN/PRT-5 radio transmitters.

AN/PRC-63 RADIO SET

The AN/PRC-63 radio set is a compact, rugged, lightweight, battery-powered, micro-electronic transceiver. (See figure 5-7.) The radio set has three basic modes of operation:

1. beacon tone transmission (activated either manually or by means of an automatic deployment device);
2. voice transmission; and
3. voice reception.



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Figure 5-7.—AN/PRC-63 radio set.

Simplicity of operation has been the keynote in the design of the AN/PRC-63 radio set. A slide switch turns the radio set on (in beacon mode) or off, and a three-position toggle switch changes from beacon transmit to either voice transmit or voice receive. A volume control, located in the upper corner of the radio set, controls the level of sound output of the beacon confidence tone (used to verify that the beacon signal is getting out) and the receiver. No other controls have been provided or are required. All these controls can be operated with either hand (bare or gloved). If the user loses consciousness and releases the radio set (once turned on), it automatically returns to the beacon mode of operation.

General Principles of Operation

The AN/PRC-63 radio set provides two-way voice communication with a searching aircraft that is equipped with compatible transmitting and receiving equipment within a range of 25 miles and an altitude of 10,000 feet. A search aircraft flying at 10,000 feet and equipped with compatible direction-finding equipment can locate an AN/PRC-63 radio set transmitting in the beacon mode at a distance of approximately 70 miles

(line of sight) between the search aircraft and the radio set.

The AN/PRC-63 radio set can be worn as part of the aircrewman's flight clothing or life jacket; it is secured to the garment by a strap attached to the slots in the battery housing. The automatic deployment device supplied with the radio set, when suitably connected to the parachute harness of the aircrewman by the user, will allow automatic transmission of the beacon tone upon parachute deployment. The radio can also be packed in a seat pack and, with the same deployment device suitably connected, can be automatically placed in beacon tone transmission mode upon ejection from the aircraft. The lanyard attached to the deployment device has been designed to withstand a pull force of 20 pounds without breaking.

The downed aircrewman may remove the radio set from his flight clothing, life jacket, or survival kit and change its mode of operation to either voice transmit or voice receive by pressing the appropriate end of the rocking toggle actuator. In the event that he becomes injured, disabled, or otherwise incapable of selecting the desired mode of operation, the radio set will continue to transmit MCW beacon signals until the battery power is exhausted.

Function and Use of Operating Controls

The function and use of the operating controls are described in table 5-1.

NOTE: When POWER ON/OFF actuator is in OFF position or in ON position with the deployment device installed, all other operating controls are disabled.

The radio set can be held in either hand and operated by the thumb or fingers, respectively. In the normal operating position, the speaker/mike faces the operator.

NOTE: During operation, the radio set must be held in the upright position (antenna vertical), or loss of transmission or reception will result. For best results, hold the radio set approximately 1 to 2 inches from the mouth when speaking, or ear when listening.

In the receive mode the sound is controlled by the volume control knob, which is located in the upper corner of the radio set (opposite the flexible whip antenna) and marked VOLUME MAX. Full clockwise rotation gives maximum volume; full counter-clockwise rotation gives minimum volume. The sound of the beacon monitoring tone is also controlled by this knob.

NOTE: Neither the beacon nor voice-transmitter output is affected by the position of the volume control knob.

Table 5-1.—Operating Controls and Functions

Control	Function
POWER OFF	Radio set is in storage condition.
POWER ON	Radio set is in beacon mode of operation.
POWER ON Deployment device installed	Radio set is in standby condition ready for automatic activation.
POWER ON RECEIVE VOICE PRESS AND HOLD	Radio set is in receive mode.
POWER ON TRANSMIT VOICE PRESS AND HOLD	Radio set is in transmit mode.

Inspections

There are three inspections/test intervals prescribed for this type of radio. (They are also prescribed for the AN/PRC-90.) The first daily/preflight is performed at the squadron level by the aircrewman. It is to be performed daily or prior to each flight. It consists of a basic operational check using an AN/PRM-32 radio tester or with the aid of a known good radio. Prior to testing the emergency radio, you should call flight operations to inform them that you are going to test a radio.

Every 90 days the radio must be inspected by the PR at the organizational level. It is best to make this inspection in conjunction with the inspection performed on the aircrewmen's personal survival equipment.

The last of the three inspections is performed at the intermediate level (AIMD). This inspection is performed every 180 days by personnel in the avionics rating.

The testing procedures for all three inspections are outlined in NAVAIR 16-30PRC 90-2 for the AN/PRC-90 radio and in NAVAIR 16-30PRC 63-1 for the AN/PRC-63.

Battery Replacement

The Mallory battery will require frequent inspections to ensure that it hasn't lost any of its operating life. When operating in a high-temperature area, the inspection should be conducted at least every 30 days. The service and shelf life of the battery expires 36 months from the date of manufacture. When the battery fails to produce the power for the radio to operate at maximum operating range, you must replace it. Any battery that shows evidence of a swelling, chipped, or cracked surface, or moisture must be condemned and a new battery installed.

AN/PRC-90 RADIO SET

The AN/PRC-90 (fig. 5-8) radio set is a dual channel, battery-powered, personal emergency rescue device used principally for two-day voice or MCW (modulated continuous wave, which is used to send Morse code signals) communications between a downed aircrewman and a rescue aircraft. The radio transmits either voice, tone (MCW), or swept-frequency homing beacon

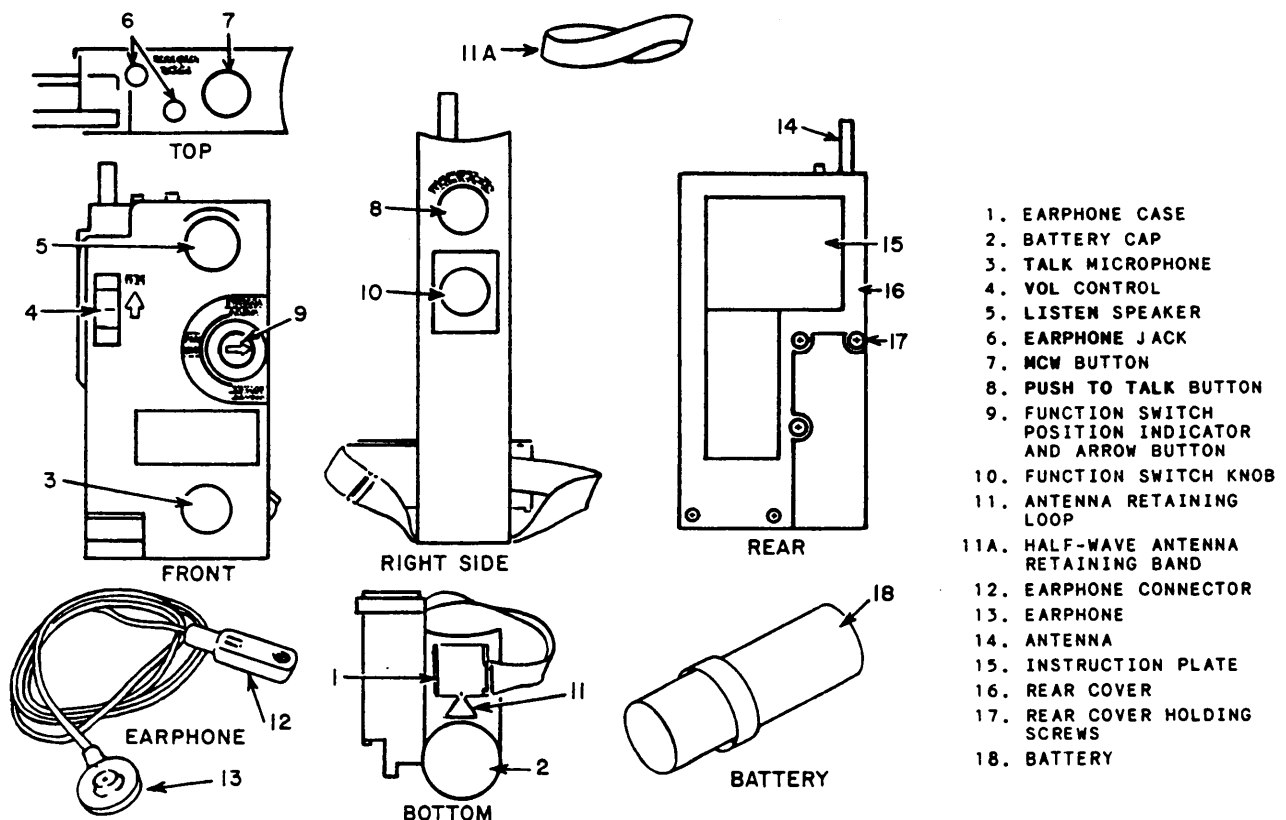


Figure 5-8.—AN/PRC-90 controls and indicators.

signals to guide rescue aircraft to the downed aircrewman. Although the PRC-90 is a line-of-sight communications device, it has a voice range under ideal conditions of 60 nautical miles to aircraft operating at 10,000 feet. The automatic direction finder has a range of 50 nautical miles and atone (code signal) range of 80 nautical miles to aircraft operating at an altitude of 10,000 feet.

Batteries

The batteries are tested by using Test Set TS 2530/UR. Batteries are considered to have a maximum shelf life of 36 months from the date of manufacture. This shelf life is based upon a

storage temperature of 70 °F. If the temperature increases, their storage life is shortened. For example, if the temperature reaches 130 °F, the storage life can be reduced to as short as 1 month. When you are in an activity that uses this battery, you should refer to NAVAIR 16-30PRC 90 for the most current shelf life information.

Operating Procedure

Refer to table 5-2 for the functions of each control on the PRC-90. The set is operated as follows:

1. Free the antenna from its stowed position by pulling its end from the retaining ring or band

Table 5-2.—Operating Controls and Indicators

Control or Indicator	Control Position	Function
Function switch	OFF VOICE/MCW 243.0	Completely removes power from radio set. Turns on the guard channel receiver to the emergency frequency of 243.0 MHz. Also enables voice and MCW guard channel transmission which are keyed by the PUSH TO TALK or MCW buttons.
	BCN 243.0	Turns on 243.0 MHz guard channel transmitter, and transmits a beacon tone. Swept audio tone is continuously transmitted for rescue aircraft to home on.
	VOICE 282.8 NOTE The button, (9, figure 5-8) must be depressed to place function switch in the VOICE 282.8 position.	Turns on alternate channel to receive on 282.8 MHz. Also enables voice transmission on auxiliary channel when PUSH TO TALK button is depressed.
PUSH TO TALK button	Depressed	Turns receiver off and turns transmitter on when function switch is in either VOICE/MCW 243.0 or VOICE 282.8 position. Best voice transmissions are obtained when spoken directly into the talk microphone.
	Released	Turns off transmitter and turns on receiver; received signal is heard with ear close to LISTEN speaker or earphone.

Table 5-2.—Operating Controls and Indicators—Continued

Control or Indicator	Control Position	Function
MCW button		This button is a telegraph key; it enables the operator to transmit code when the normal transmitting level of his voice may reveal his position. MCW is only obtainable when the function switch is in the VOICE/MCW 243.0 position.
	Depressed	Causes radio set to transmit a continuous tone, receiver off.
	Released	Turns transmitter off, receiver on.
VOL control		This controls the volume of the sound from the LISTEN speaker or earphone. It controls received signals, not sidetone.
	Fully Up, MAX	Loudest sound
	Fully down	Quietest sound, but radio set is not turned off.
		NOTE Volume control does not affect transmitted power output.
LISTEN speaker		Sound of received signal is heard by placing ear close to LISTEN speaker. Sound of MCW or beacon transmitter may also be heard. The LISTEN speaker is shut off when the earphone is connected.
TALK microphone		Picks up the voice being transmitted when PUSH TO TALK button is depressed and function switch is set to either VOICE/MCW 243.0 or VOICE 282.8.
Earphone jack	Earphone connected	Causes sound to be heard in earphone. A magnet in the earphone connector (12, figure 5-8) shuts off the LISTEN speaker.
	NOTE Connector may be joined to jack in either of two polarities.	
	Earphone disconnected	Sound is heard through LISTEN speaker.
Battery cap		Holds battery in place.

as appropriate. The antenna snaps into an upright position. Fully extend all five telescopic sections of the half-wave antenna by grasping it by its tip and pulling outward.

2. Set the function switch to the mode of operation that you want. The function switch is set by rotating the thumb knob on the right-hand side so that the arrow points to the mode selected. The function switch is detented and clicks into each position. Rotate the knob down one click (from OFF) for VOICE/MCW 243.0 operation, or two clicks for BCN 243.0 operation. For VOICE 282.8 operation (secondary channel), push the button with the arrow and rotate the function switch knob up one click.

3. For voice operation, hold the radio set and adjust the VOL control. To transmit, push down the PRESS TO TALK button and speak directly into the TALK microphone.

4. If guard channel steady-tone transmission or Morse code operation is desired, set the function switch to VOICE/MCW 243.0. Depress the MCW button to transmit the tone. Listen for the sidetone in the LISTEN speaker or earphone while the MCW button is depressed. This sidetone indicates proper transmitter operation.

5. For guard channel beacon operation, set the function switch to BCN 243.0. The transmitter

continuously sends the swept-tone beacon signal at this setting. Listen for the sidetone as an indication of proper operation. In the beacon mode, the sidetone is a chirping sound.

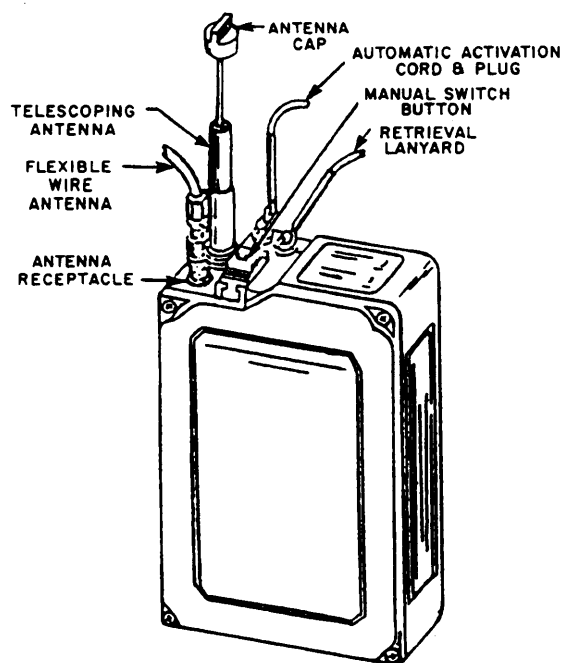
NOTE: Since the transmitter is keyed automatically in the beacon mode, and since continuous transmission may be needed for a prolonged period of time, the AN/PRC-90 may be placed upright on a flat surface. It will then transmit automatically.

AN/URT-33A BEACON SET RADIO

The Beacon Set Radio, AN/URT-33A (figs. 5-9 and 5-10), is an emergency radio beacon transmitter that, when properly actuated, transmits a tone-modulated radio frequency signal on the emergency guard frequency of 243.0 MHz.

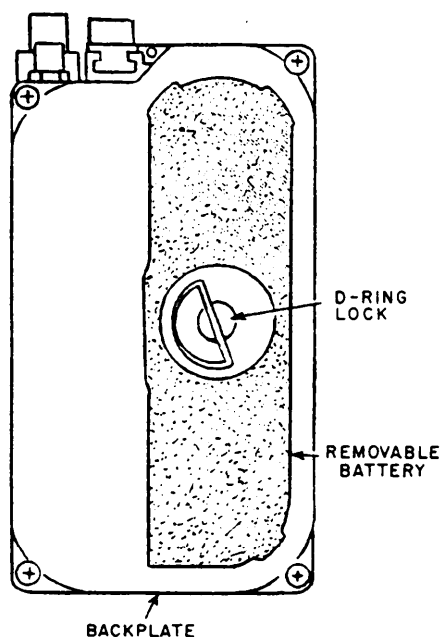
Although the AN/URT-33A was designed to be placed into a parachute pack, the Navy normally places the beacon radio into the seat pan (RSSK) or life rafts. Instructions for properly rigging the AN/URT-33A can be found in NAVAIR 13-1-6.1.

The AN/URT-33 radio has two types of antennae. One type is the flexible wire antenna. This antenna is used during parachute descent



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Figure 5-9.—Beacon set, radio, AN/URT-33A (front view).



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Figure 5-10.—Beacon set, radio, AN/URT-33A (rear view).

since the radio is activated when the aircrewman leaves the aircraft.

The flexible wire antenna serves as the principal antenna during descent. Upon landing, the flexible antenna is removed by the aircrewman, and a telescopic antenna that is built into the radio is used.

The AN/URT-33A radio is battery-operated. The battery is a mercury type with a storage life of 24 months, provided that the storage temperature is 70°F. At a storage temperature of 100°F, the storage life is only 12 months. For survival equipment applications, such as rigid seat survival

kits and life rafts, the service life of the battery assembly is 2 years from the date of manufacture, 225 days from the date placed into service, or 231 days for the SKU-2/A or RSSK-7 seat survival kit. Ensure that the battery service life does not expire prior to the next scheduled inspection of the assembly in which the radio beacon set is installed.

AN/PRT-5 TRANSMITTING SET

Transmitting Set, Radio AN/PRT-5 (fig. 5-11) is a battery-operated, emergency beacon

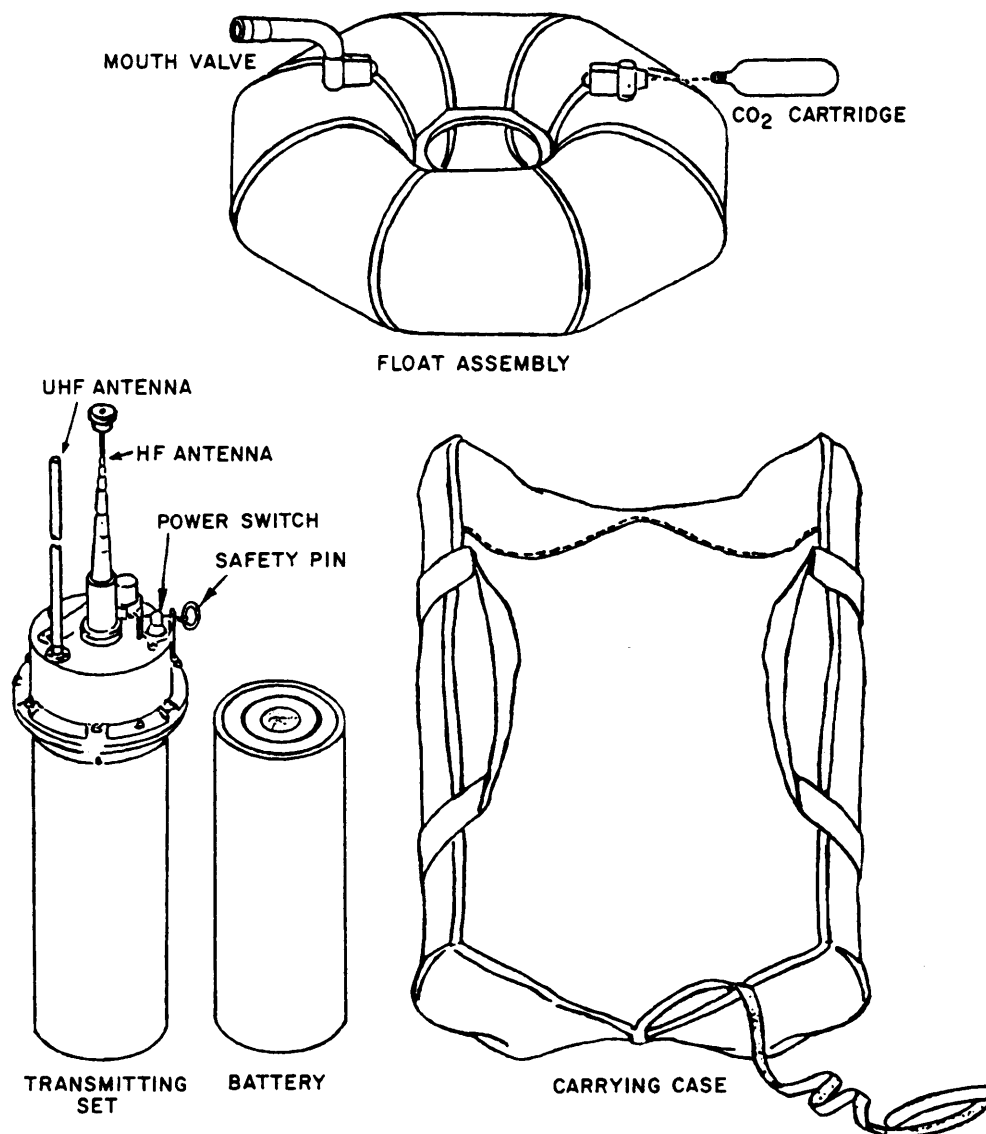


Figure 5-11.—Transmitting set, radio, AN/PRT-5, identification of components.

239.441

transmitter that, when properly activated, transmits a tone-modulated radio frequency signal on the emergency guard frequencies of 8.364 MHz and 243.0 MHz simultaneously. The transmitting set includes an inflatable float assembly that keeps the transmitting set afloat at sea, and provides a support platform on land. The entire set is packed in a carrying case for stowing in a life raft.

The transmitting set is intended for signaling the location of downed aircraft or airmen. Because it provides signals in both the high frequency (HF) and ultra high frequency (UHF) portions of the spectrum, it can be detected by search aircraft, surface vessels, and coastal-based stations at considerable distances.

The battery pack is designed to provide 72 hours of continuous operation at 25°C (77°F) with at least 250 milliwatts of output from each transmitter at the end of this period. The transmitting set will continue to transmit until the battery pack is completely discharged.

Modulation of the transmitter is by internal means only. No provision has been made for voice or code communications, or for receiving signals from search craft.

To prepare the radio for use is a simple procedure.

1. Pull the free end of the UHF antenna through the grommet in the float assembly to allow the antenna to stand vertically.

2. Unscrew the top section cap of the telescopic HF antenna, and pull the antenna out to its full length. When fully raised the antenna sections are alternate black and gray with the top section gray. The antenna, when fully extended, is approximately 9 feet high. (See figure 5-12.)

3. Pull out the switch safety pin (fig. 5-11).

4. Turn the POWER toggle switch to ON (fig. 5-11).

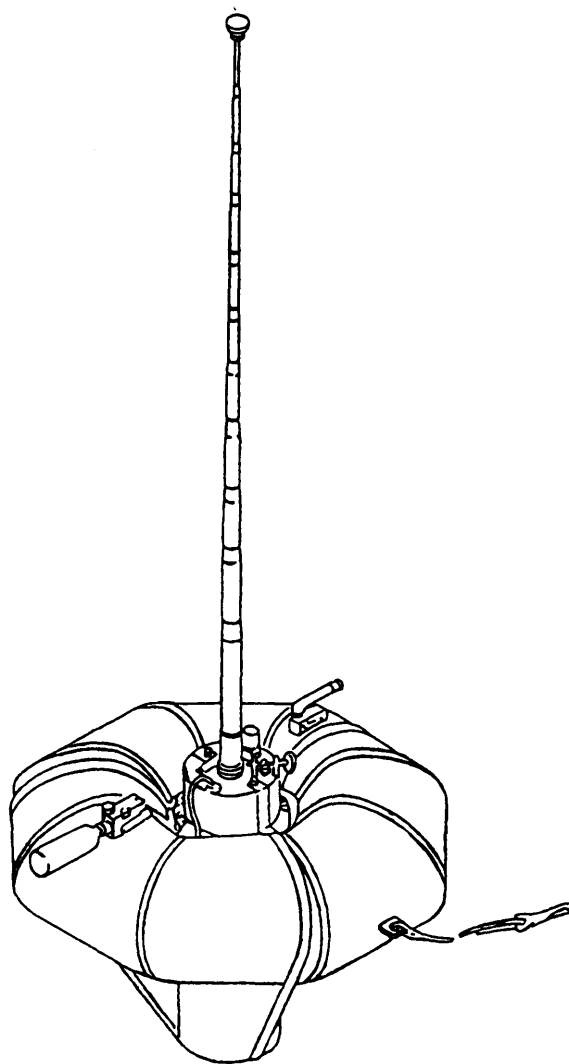
5. Place the entire assembly in the water and tow it behind the life raft.

6. When operating on land, be sure the transmitting set is placed on level ground so that the antennas are vertical. Do not stand close to the transmitting set because this can cause changes in the radiation pattern of the transmitted signals.

7. If desired, the safety pin can be replaced to prevent the transmitting set from being turned off accidentally.

HELICOPTER RESCUE DEVICES

Every Aircrew Survival Equipmentman should be familiar with the equipment used in rescue



239.442

Figure 5-12.—Transmitting set, radio, AN/PRT-5 with flotation collar.

from the sea or land by helicopters. (Refer to *Navy Search and Rescue Manual*, NWP 19-1, for procedures and techniques involving at-sea aircrew rescues.) The helicopter's ability to land and takeoff in a small area and to hover over a spot lends itself very effectively to rescue work.

There are three methods by which a helicopter may make a rescue. The first is by hovering, the second by landing, and the third by making a low, slow pass with the rescue device hanging near ground level. The latter is used mainly in hostile areas when the helicopter pilot does not wish to present the aircraft or the survivor as a stationary target for enemy gunners. By far, the most common helicopter pickup is made by hovering.

NOTE: A static charge of electricity is built up in the helicopter and must be dissipated by grounding. Do NOT touch the rescue device until after it has contacted the ground or water to permit the discharge of static electricity and prevent electrical shock.

Research, development, test, and evaluation of air rescue devices has been continuous since the helicopter became the primary rescue vehicle. The various types of rescue devices, their functions, and associated maintenance procedures are discussed in the sections that follow.

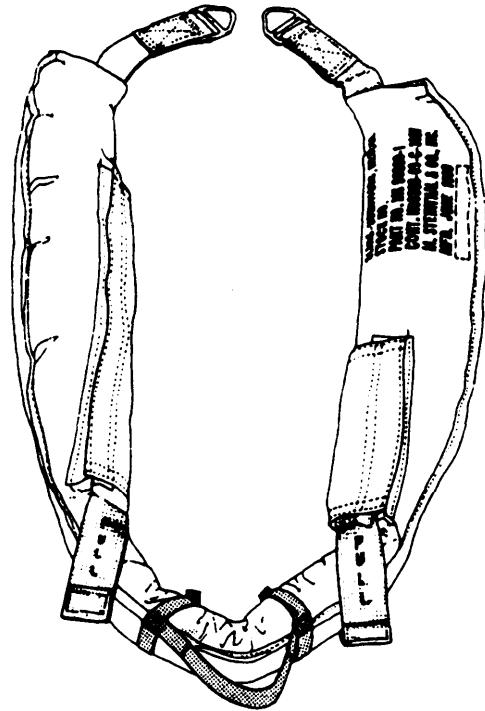
All helicopter rescue devices must be scheduled into periodic maintenance under the direction and control of the maintenance/material control officer to which the equipment is assigned. Maintenance must be thorough at all times. No instance of careless treatment or willful neglect of aircrew personal protective equipment will be condoned. The vital function of the equipment must be uppermost in the minds of all personnel concerned.

Individual parafoists normally store and maintain all helicopter rescue devices, and checkout is on an individual basis. Because of the lack of individual identification of the rescue devices, it is impossible to match the Aviation Crew Systems History Card to the rescue device. All rescue devices should be locally serialized by individual parafoists to ensure positive control of inspection cycles performed on helicopter rescue devices.

SURVIVOR'S SLING

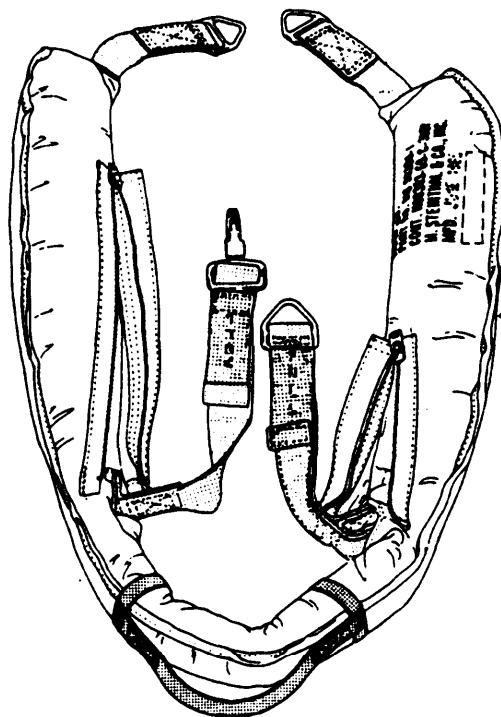
The survivor's sling is a buoyant device consisting of a kapok filling encased in a bright yellow waterproof cover to make it highly visible during rescue operations. Webbing, reeved through the cover with both ends terminating in two V-rings, is used to attach the sling to the helicopter rescue hook. Two retainer straps, one long with a quick-ejector snap and one short with a V-ring, are fastened to the webbing of the sling and are enclosed in slide fastener-secured envelopes. Refer to figures 5-13 and 5-14.

The survivor's sling (also known as the "horse collar" and rescue sling) is used to assist personnel performing rescue work from a helicopter over water or land. The survivor's sling is lowered on a hoist cable from a helicopter to the rescue swimmer and survivor. The sling is designed to accommodate one survivor at a time.



239.404A

Figure 5-13.—Survivor's sling.



239.404B

Figure 5-14.—Survivor's sling retainer straps pulled out.

Maintenance

The aircrewman's responsibility for maintenance of the survivor's sling is limited to a freshwater wash. Repairs or other actions are performed by organizational-level maintenance or above.

All survivor's slings are subject to a calendar inspection upon issue and at intervals not to exceed 225 days. All survivor's slings are subject to a preflight inspection also. This action is performed by the aircrewman before each flight and at least every 14 days. This inspection consists of a visual inspection outlined in the calendar inspection procedures.

Calendar Inspections

The calendar inspection consists of a visual inspection and a proof load test.

To perform the visual inspection, proceed as follows:

1. Inspect all fabric for cuts, deterioration, and abrasion.
2. Inspect seams for proper adhesion and stitching.
3. Inspect the retainer straps for security of attachment and wear.
4. Inspect all hardware for security of attachment, corrosion, damage, wear, and, if applicable, ease of operation.
5. Inspect all markings. If the markings are faded or incorrect, they must be corrected by using black washproof ink.

The proof load test is performed on the survivor's sling during the calendar inspection and after each flight in which saltwater immersion has occurred. To perform a proof load test, proceed as follows:

1. Allow the sling to dry completely.
2. Inspect for damage to webbing of survivor's sling. Damage other than frayed or separated stitches is cause for replacement.
3. Place the survivor's sling in a webbing testing machine.

NOTE: If a webbing testing machine is not available, refer to NAVAIR 13-1-6.5 for a suitable alternate testing method.

4. Apply a load of 500 pounds at a rate of 1 inch per minute.
5. Again, inspect for any damage to the webbing of the survivor's sling. Damage other than frayed or separated stitches is cause for replacement.

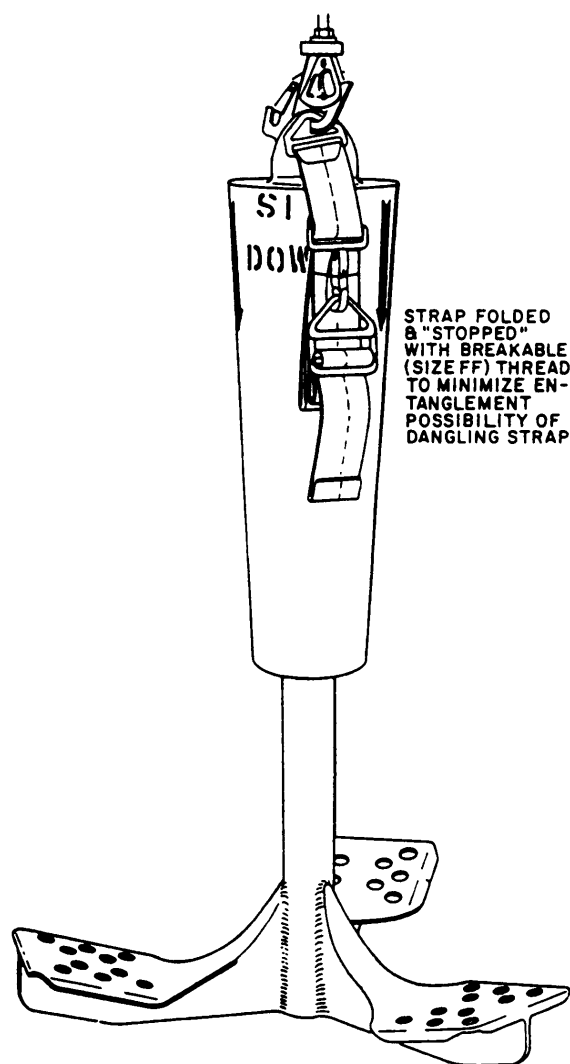
6. Remove the sling from the webbing testing machine.

The survivor's sling must be cleaned after every immersion in salt water. To clean the survivor's sling, proceed as follows:

1. Clean the sling and its cover with a mild soap and water solution. Rinse well with fresh water.
2. Dry the sling and its cover with a clean, dry, lint-free cloth.

RESCUE SEAT

The rescue seat is a buoyant aluminum device consisting of a hollow flotation chamber and a three-pronged seat, with prongs 120 degrees apart (fig. 5-15). Lead is inserted in the base of the



239.405

Figure 5-15.—Helicopter rescue seat.

assembly to minimize roll and to provide the proper degree of submergence of the seat in the water. A safety strap is provided to assist the survivor to remain in the seat during hoisting to the helicopter. The flotation chamber and hoist bracket of the seat are bright orange. The lower seat assembly is yellow for high visibility.

The helicopter rescue seat is intended for use in retrieving survivors and assisting the rescue swimmer in performing rescue operations when it is difficult to make a helicopter landing over land or water.

When conducting a rescue, the helicopter rescue seat is lowered on a hoist cable from a helicopter to the rescue swimmer and survivor. The rescue seat is designed to accommodate one person at a time.

Maintenance

The aircrewman's responsibility for maintenance of the rescue seat is limited to freshwater wash after usage. Repairs or other maintenance actions required are performed by organizational-level maintenance or above.

Inspection

All rescue seats are given a calendar inspection upon issue and at intervals of 225 days. The calendar inspection is a visual inspection. To visually inspect the condition of the rescue seat, proceed as follows:

1. Inspect all components for security of attachment, corrosion, damage, wear, discoloration, and ease of operation.
2. Check for sharp edges or projections.
3. Check material for imperfections or damage.
4. Check safety strap for fraying or tears.
5. Compare markings on seat to markings listed in applicable table in NAVAIR 13-1-6.5.

If the markings are faded, restore them with black washproof ink. If marking is incorrect, paint it out and enter the correct marking as close to the proper location as possible, using black washproof ink.

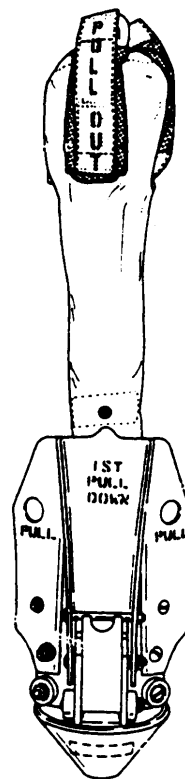
Cleaning

The rescue seat must be cleaned after every immersion in salt water. Clean it as follows:

1. Wash the rescue seat with a mild soap and water solution. Rinse well with fresh water.
2. Dry the rescue seat with a clean, dry, lint-free cloth.
3. Return the seat to service.

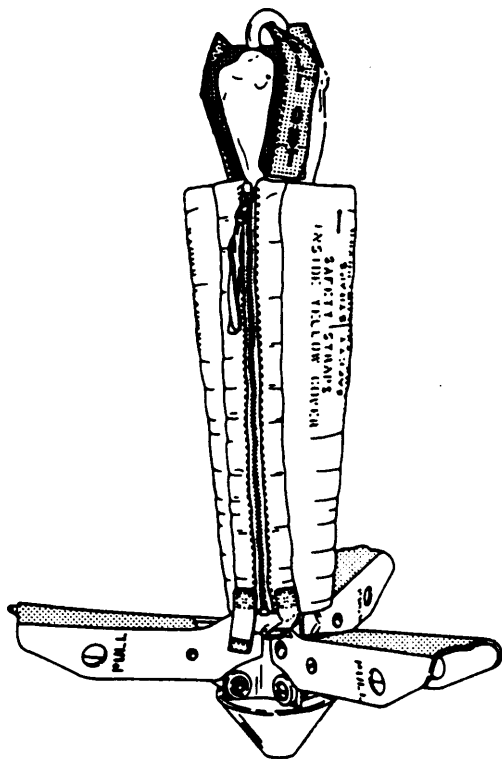
FOREST PENETRATOR AND FLOTATION COLLAR

The forest penetrator is bright yellow for high visibility, and is a compact device weighing about 21 1/2 pounds. The forest penetrator is 34 inches long and 8 1/8 inches in diameter with the three seats retracted, and 26 inches in diameter with the seats extended. Each seat is 4 3/4 inches wide, 11 1/2 inches long, and is spring-loaded in the retracted position (flush against the shaft of the penetrator). A spring-loaded retaining latch is provided under each seat to secure the seat in the extended position. To release the seat, push down on the seat and pull down on the latch. The seat then snaps back into the retracted position. Three webbing safety straps are provided to hold the survivors in place. Each strap extends 4 feet 9 1/4 inches, with an adjustable quick-ejector hook attached to the upper section of the penetrator. The straps terminate with a yellow fabric, marked TIGHTEN. Yellow webbing tabs (with hook tape) marked PULL OUT are sewn to the safety straps for attachment to fabric cover stowage openings. The yellow fabric cover has a 17-inch slide fastener and three stowage openings (with pile tape for securing safety straps). (See figure 5-16.)



239.406A

Figure 5-16.—Forest penetrator.



239.406B

Figure 5-17.—Flotation collar installed on forest penetrator.

The flotation collar is made of bright orange foam rubber for high visibility and weighs about 1 1/2 pounds. (See figure 5-17.) It is 2 1/4 inches long, with a 7 3/4-inch diameter at the top and a 4-inch diameter at the bottom. When the flotation collar is installed on the forest penetrator, the retracted diameter at the penetrator is 9 inches.

The forest penetrator and flotation collar are intended to assist the rescue swimmer to perform rescue operations in the water or to rescue survivors on land.

The flotation collar is a device that, when fastened around the forest penetrator, allows flotation of the complete assembly during air-sea rescue operations.

During land rescue operations, the forest penetrator is lowered to the survivor with the seats retracted. For sea operations the forest penetrator is lowered to the rescue swimmer and survivor with the flotation collar installed, safety straps hanging free, and the seats retracted. In this configuration, the penetrator will float its top about 6 inches above the surface of the water.

The forest penetrator is designed to accommodate one, two, or three survivors at the same time.

Maintenance

The aircrewman's responsibility for maintenance of the forest penetrator is limited to washing with fresh water. Repairs or other actions are performed by organizational-level maintenance or above.

Inspection

All forest penetrators receive a calendar inspection upon issue and at intervals not to exceed 225 days. The calendar inspection consists of visually inspecting both the forest penetrator and flotation collar.

When inspecting the condition of the forest penetrator and flotation collar, examine the following:

1. All fabrics for cuts, tears, deterioration, and abrasion.
2. Seams for proper stitching.
3. Straps for security of attachment and wear.
4. Any other parts for wear, damage, and security of attachment.
5. All hardware for security of attachment, corrosion, damage, wear, and, if applicable, ease of operation.
6. The cover for strains, dirt, and general condition.
7. The slide fastener for damage, corrosion, and ease of operation.
8. Compare markings on the forest penetrator and flotation collar to markings listed on the applicable tables in NAVAIR 13-1-6.5. Restore any faded markings, and correct markings, if necessary, with indelible ink.

Cleaning

The forest penetrator and flotation collar must be cleaned after every immersion in salt water as follows:

1. Wash the penetrator and collar with a mild soap and water solution. Rinse well with fresh water.
2. Wipe the penetrator and collar with clean, lint-free cloth and allow to dry.
3. If necessary, apply silicone lubricant to slide fasteners on the cover of the penetrator to ensure ease of operation.

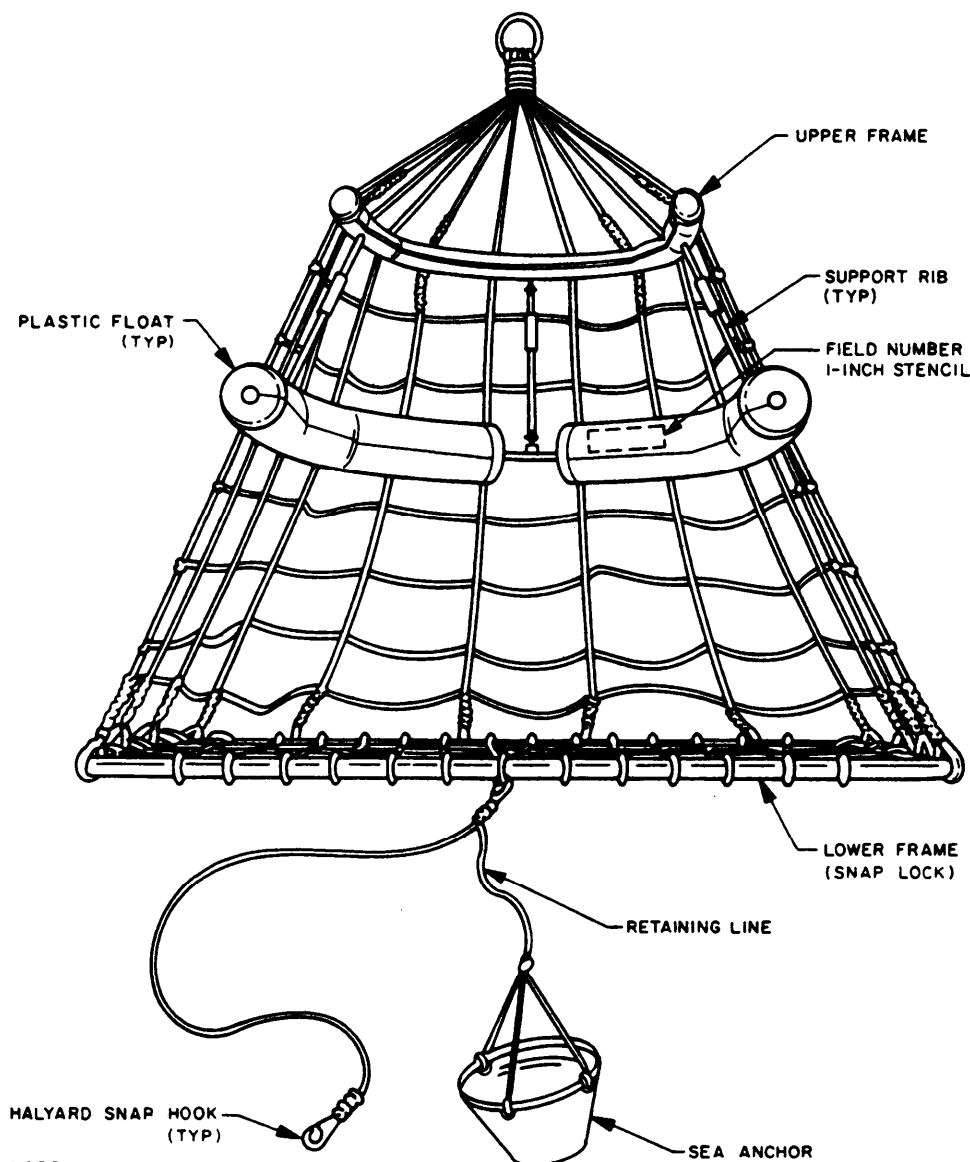
4. Apply a lubricating oil to all pivot points of the penetrator. Wipe off excessive lubricating oil.

5. Return both assemblies to service.

RESCUE NET

The rescue net looks like a conically shaped birdcage with an opening on one side. The net weighs approximately 20 pounds and is bright yellow for high visibility. To stabilize the net during use, a sea anchor is provided. A 10-foot sea

anchor retaining line with two single snap hooks is also provided. One halyard snap hook permits complete removal of the sea anchor from the net, while the other snap hook permits shortening of the sea anchor to 5 feet to be used in moderate seas. During high seas, the 10-foot retainer line is used. The rescue net has a snap lock lower frame and three upper support ribs with sliding sleeves that form a rigid cage when the net is fully extended. Foam plastic floats are provided on the rigid upper frame of the net. (See figure 5-18.)



NOTE:

CARGO DOOR AND SEA ANCHOR ARE ALSO SUPPLIED AS OPTIONAL PIECES OF EQUIPMENT WITH THE RESCUE NET.

Figure 5-18.—Rescue net, parts nomenclature.

239.407

The rescue net is used to assist the rescue swimmer performing rescue work from a helicopter over water or land. The rescue net may also be used to ferry or pick up cargo.

WARNING

THE SEA ANCHOR MUST NOT BE USED WHEN HOISTING PERSONNEL OUT OF THE WATER.

Maintenance

The aircrewman's responsibility for maintenance of the rescue net is limited to a freshwater wash after use. Repairs or other actions required are performed by organizational-level maintenance or above.

Inspection

All rescue nets are given a calendar inspection upon issue and at intervals of 225 days. The calendar inspection for the rescue net consists of the following visual inspection:

1. Erect the net by unfolding its lower frame assembly and forcing the assembly down. The frame will snap open.
2. Suspend the open section of the net and slide sleeves or the upper support ribs between the swivel joints. The sleeves rest on the support rib stops.
3. Inspect all hardware for security of attachment, corrosion, damage, wear, and ease of operation.

Cleaning

To clean the rescue net, proceed as follows:

1. Wash the rescue net with a mild soap and water solution. Rinse well with fresh water.
2. Allow the net to air dry.

RESCUE HARNESS

The rescue harness consists of nylon webbing shoulder straps, riser straps, back strap, an adjustable chest strap, and a lifting strap (fig. 5-19). The end of the lifting strap, equipped with a gated D-ring, adapter assembly, release assembly, and parachute harness triangle link are stowed in a pouch on the front of the harness.

A handle on the pouch allows for ease of accessibility of the gated D-ring during rescue operations. Right and left pocket assemblies are located at each junction of the riser and lifting strap. The left pocket is designed to hold one Mk 13, Mod 0 marine smoke and illumination signal and the right pocket is designed to hold the other Mk 13, Mod 0 marine smoke and illumination signal and the suspension line cutter. A knife scabbard is attached to the left side of the lifting strap.

The rescue harness is designed specifically to be worn by the rescue swimmer, providing him maximum mobility and a means for performing rescue operations in the water.

Maintenance

The aircrewman's responsibility for maintenance of the harness is limited to freshwater wash after usage. Repairs or other maintenance actions required are performed by intermediate-level maintenance or above unless otherwise specified.

Preflight Inspection

The rescue harness preflight inspection is accomplished prior to each flight, and at intervals not to exceed 14 days. This inspection is made by the aircrewman. To perform a preflight inspection, examine the following:

1. Fabric and webbing for cuts, tears, open seams, and loose or broken stitching
2. Signs of contamination, such as stains and discoloration

Calendar Inspection

The calendar inspection is performed by organizational-level maintenance or above upon issue before placing the rescue harness in service and every 90 days thereafter. To perform the calendar inspection, proceed as follows:

1. Service life check. The service life of the rescue harness is 7 years from the date it was placed in service or 8 1/2 years from the date of fabrication, whichever occurs first. When an assembly reaches its

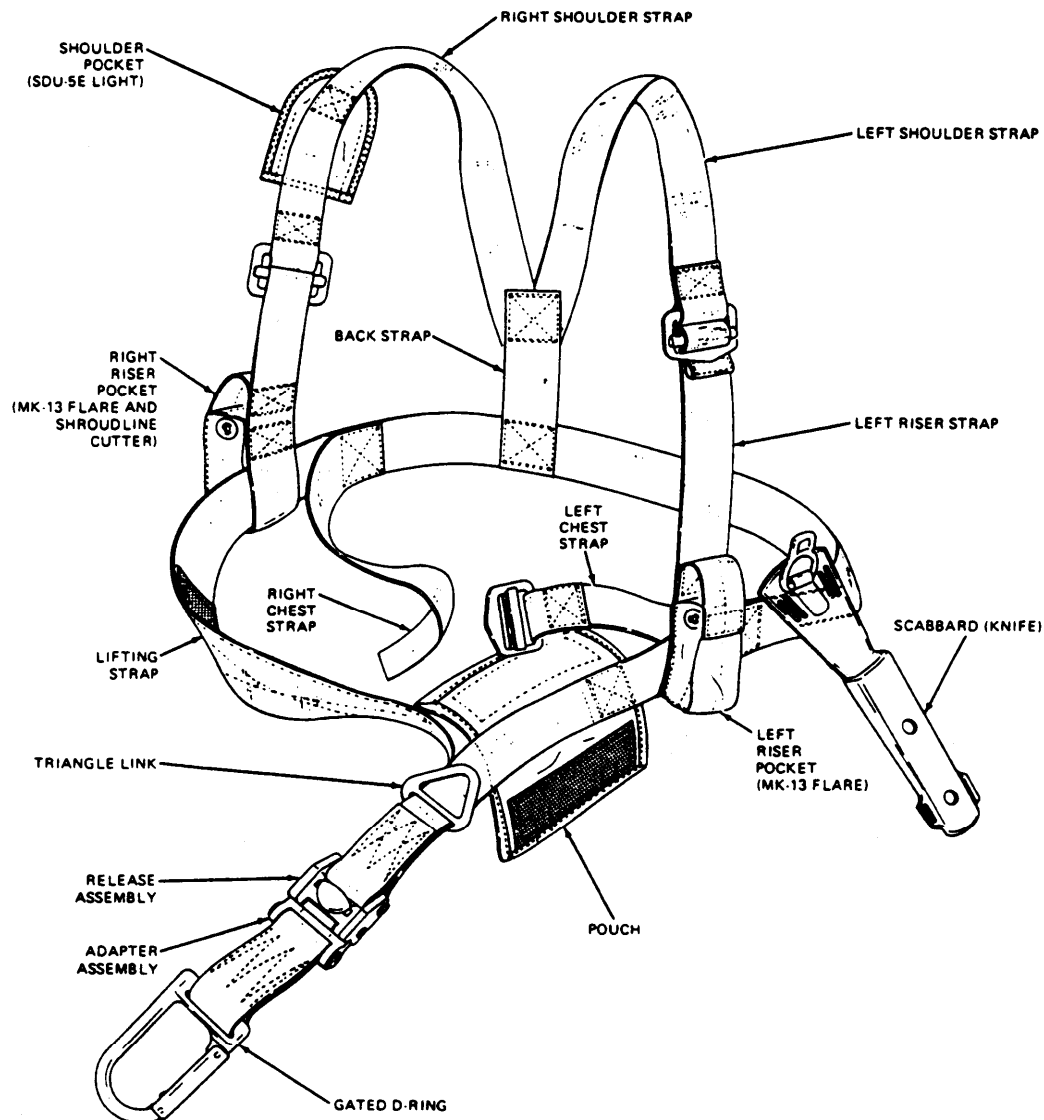


Figure 5-19.—Rescue harness.

239.408

service life limit, it is removed from service and scrapped. To perform a service life check, proceed as follows:

- a. When a rescue harness is placed in service, the start of service date is stenciled on the inside of the chest strap.
- b. When an in-service rescue harness lacks a start service date, service life expires 7 years from date of manufacture.
- c. The date of manufacture is located on the inside of the chest strap.

2. Contamination inspection. To inspect a rescue harness for acid or alkaline contamination, proceed as follows:

CAUTION

ENSURE THE AREA TO BE TESTED IS ISOLATED FROM ANY SOURCE OF CONTAMINATION THAT MAY RESULT IN ERRONEOUS READINGS.

- a. Dampen the suspected area with distilled water.

b. Place a piece of full-range test paper on the dampened area. Compare it to the color standard provided with the paper. The color it changes to indicates the approximate pH reading and which specific short-range test paper to use.

c. Place the short-range test paper on the dampened area. Its color indicates the pH factor of the affected area.

d. If acid contamination is found, the assembly must be considered nonrepairable and scrapped.

e. If alkaline contamination is found, rinse the assembly in cool, fresh water until a safe reading is obtained. All fabric and webbing must then be carefully inspected for any sign of deterioration.

3. Visual inspection. To inspect the rescue harness, examine the following:

a. Harness webbing for cuts, tears, fraying, deterioration, and security of stitching.

b. Front pouch and right and left pockets for cuts, tears, fraying, deterioration, and security of stitching.

c. Gated D-ring and all other hardware for corrosion, distortion, sharp edges, security of attachment, and ease of operation.

d. Hook and pile tape fasteners for condition and proper mating.

Cleaning

Clean the rescue harness as often as necessary to remove perspiration stains, dirt, and other stains that may degrade performance of the assembly. To clean a rescue harness, proceed as follows:

1. Wrap all metal fittings in heavy flannel cloth.

CAUTION

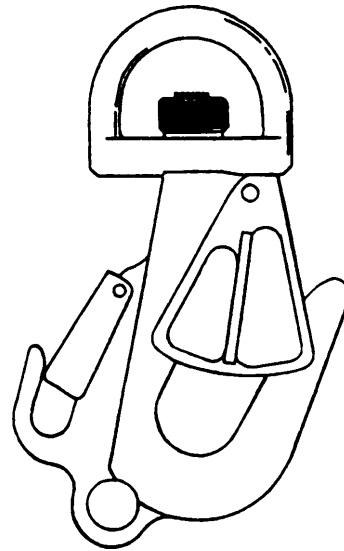
DO NOT SCRUB RESCUE HARNESS.

2. Soak the assembly in cool, fresh water for 2 to 3 hours to loosen any set stains.

3. Drain this water and immerse the harness in a tub of fresh water (not over 120°F). Gently agitate by hand.

4. After 5 to 10 minutes of agitating, repeat step 3.

5. Petroleum and other stubborn stains may be removed by repeated applications of a mild soap and water solution. Each application must be followed by a rinse in cool, fresh water.



239.409

Figure 5-20.—Rescue hook.

6. Hang the rescue harness on a wooden hanger until dry.

RESCUE HOOK

The rescue hook consists of one large hook, an adjacent small hook, and ring located at the bottom of both-hooks. A bearing assembly is attached to the upper section allowing the hook to rotate freely about its axis. The large hook supports 3,000 pounds and is used to hoist personnel. The smaller hook supports 1,000 pounds and is used to hoist equipment. The ring at the bottom supports 1,500 pounds and is also used to hoist miscellaneous equipment. Both hooks have a spring-loaded latch to prevent inadvertent release of personnel or equipment. (See figure 5-20.)

The rescue hook is attached to the hoist cable and is used to assist rescue personnel in performing rescue operations from a helicopter. The rescue hook can hoist personnel and/or equipment during both sea and land helicopter rescues.

Maintenance

The aircrewman's responsibility is to inform maintenance control if equipment has been immersed in salt water. Repairs or other actions required are performed by organizational-level maintenance or above.

Calendar Inspection

All rescue hooks get a calendar inspection upon issue and at intervals to coincide with the aircraft cycle. In no case shall the intervals between calendar inspections exceed 225 days. The calendar inspection consists of the following visual inspection:

1. Inspect for missing, bent, fractured or damaged components.
2. Check hardware for security of attachment, corrosion, wear, and ease of operation.
3. Check for sharp edges and projections.

Cleaning

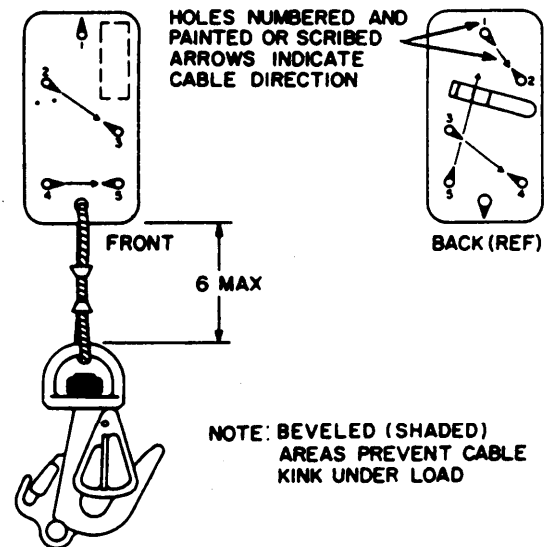
Clean the rescue hook after every immersion in salt water. To clean the rescue hook, proceed as follows:

1. Clean devices with an acceptable cleaning agent.
2. Remove all foreign objects with low-pressure air.
3. Lubricate all moveable parts of the rescue hook. Wipe off excess lubricant with a clean, dry, lint-free cloth.
4. Return the rescue hook assembly to service.

HOIST QUICK-SPLICE PLATE

The hoist quick-splice plate is made of 1/4-inch aluminum, 6 5/8 inches in length by 3 inches wide. The corners are rounded off and holes are grooved in places where the hoist cable rests. A stainless steel clip, 1/32 inch thick, is attached to the plate with two, 5/32-inch steel rivets. A rescue hook is attached to the plate with thimbles, swaging sleeve, and a length of hoist cable. The distance between the rescue hook and the plate is 6 inches. (See figure 5-21.)

The hoist quick-splice plate is used when the hoist cable is cut or broken during a rescue operation. It is used when time is a factor and no other means are available for rescue.



239.410

Figure 5-21.—Hoist quick-splice plate.

Maintenance

The aircrewman's responsibility for maintenance of the hoist quick-splice plate is limited to giving it a freshwater wash. Repairs or other actions are performed by organizational-level maintenance or above.

Calendar Inspection

All hoist quick-splice plates are given a calendar inspection upon issue and at intervals of 225 days. The calendar inspection consists of a visual inspection for bends, corrosion, sharp edges, and projections.

Cleaning

You have to clean the hoist quick-splice plate after every immersion in salt water. To clean it, proceed as follows:

1. Clean with an acceptable cleaning agent.
2. Dry with a lint-free cloth.

CABLE GRIP

The cable grip (which opens and closes on the cable) and a shackle enable the cable grip to be attached to the crewman's safety belt to take the weight off the hoist assembly during a hoist

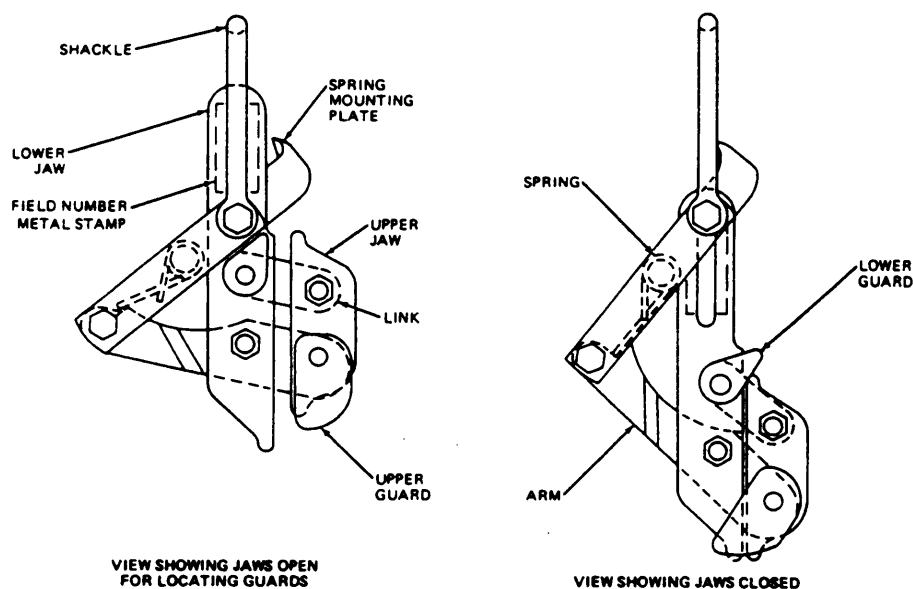


Figure 5-22.—Cable grip.

239.411

failure. The cable grip is capable of supporting 1,000 pounds. (See figure 5-22.)

The cable grip is an emergency condition device used by personnel performing rescue operations from a helicopter when the rescue hoist has a malfunction that renders the hoist inoperable. The cable grip is used for quick temporary attachment to the hoist cable.

Maintenance

The aircrewman's responsibility for maintenance of the cable grip is limited to a freshwater wash and to informing maintenance control that it has been used. Repairs or other actions required are performed by organizational-level maintenance or above.

Calendar Inspection

All cable grips are subject to a calendar inspection upon issue and at intervals of 225 days. To inspect the condition of the cable grip, proceed as follows:

1. Inspect for missing, bent, fractured or damaged components.
2. Check hardware for security of attachment, corrosion, wear, and ease of operation.
3. Check for sharp edges and projections.

Cleaning

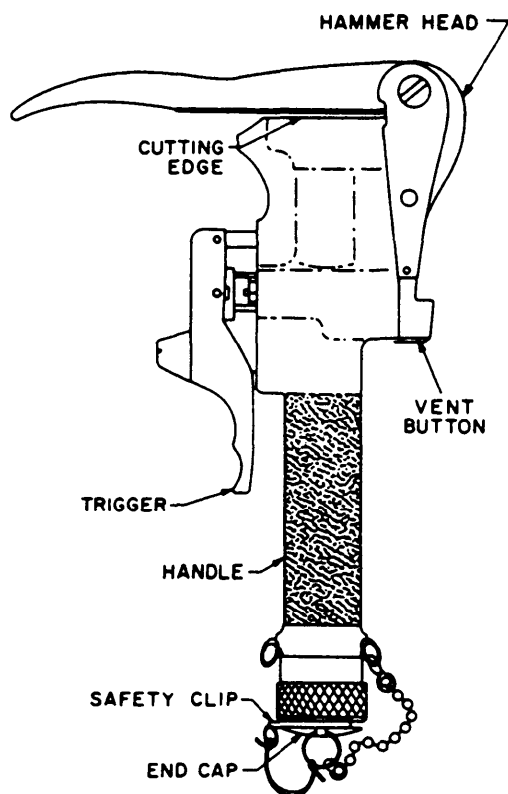
Clean the cable grip every time it has been immersed in salt water. To clean it, proceed as follows:

1. Clean devices with an acceptable cleaning agent.
2. Remove all foreign objects with low-pressure air.
3. Lubricate all movable parts of the cable grip with lubricating oil. Wipe off any excess oil with clean, dry, lint-free cloth.

PNEUMATIC RESCUE HAND TOOL

The pneumatic rescue hand tool is a cartridge-operated device. A chamber within the handle secures a 3,000 psi nitrogen gas cylinder, which provides a very powerful force against the cutting blade.

The case is made of nylon webbing, 12 1/2 inches long and 5 3/4 inches wide at the top, tapering to 3 1/4 inches wide at the bottom. A 46-inch lanyard and baby swivel hook, attached to the upper grommet, are designed for



239.412
Figure 5-23.—Pneumatic rescue hand tool.

attachment to the pneumatic rescue hand tool. (See figure 5-23.)

The pneumatic rescue hand tool is designed for helicopter rescue crewman to use during air/sea rescue operations.

The pneumatic rescue hand tool gives the crewman a readily available cable cutter and parachute harness webbing cutter. The tool can cut single strands of stainless steel cable up to 7/32 inch in diameter as well as harness webbing of thickness up to and including 1/4 inch and widths up to 1 3/4 inch, in single cuts. The pneumatic rescue hand tool, complete with case, should be readily available to the rescue crewman during rescue operations.

Maintenance

The aircrewman's maintenance of the pneumatic rescue hand tool is limited to a freshwater rinse. Repairs or other maintenance action required are done by organizational-level maintenance or above.

Calendar Inspection

The pneumatic rescue hand tool is inspected upon issue and at intervals not to exceed 225 days. The calendar inspection consists of a visual inspection and a functional test. To perform a visual inspection, proceed as follows:

1. Inspect all parts for corrosion, cracks, wear, and any other defects.
2. Inspect blade for sharpness. Sharpen, using an appropriate whetstone, or replace as necessary.
3. Inspect the anvil for scored surface.

The functional test consists of the following tasks:

1. Leakage test. To perform a leakage test, proceed as follows:
 - a. Pressurize the hand tool to 3,000 psi with a nitrogen cartridge.
 - b. Immerse the pressurized hand tool in fresh water and rotate the tool in three directions to eliminate any trapped air in external pockets.
 - c. Any leakage after 1 minute indicates a defective seal of the component from which the gas is escaping. Replace seals as necessary.
2. Trigger force test. To perform a trigger force test, proceed as follows:
 - a. Mount the pressurized hand tool in an appropriate fixture, cradle or V-block.
 - b. Using a push-pull scale, measure the trigger force necessary to actuate the blade on the first stroke. The force is applied midway on the finger area of the trigger. Two thicknesses of Type XIII, MIL-W-4088C, webbing should be cut. The trigger force is between 5 and 20 pounds. Trigger force outside this range indicates the need for repair of the trigger (forward) valve or the trigger assembly.
3. Performance. To conduct a performance test, proceed as follows:
 - a. Cut a double thickness of webbing, and with the trigger in the depressed position, immerse the hand tool in water.
 - b. Any leakage after 1 minute of immersion indicates the piston seal leaks or the exhaust (rear) valve leaks.
 - c. Make 10 additional double webbing cuts. After the tenth cut, with the trigger depressed, immerse the hand tool in water.

d. Check for leakage during 1 minute of immersion. Any leakage indicates the trigger (forward) valve is faulty.

e. Make additional cuts of double webbing until the hand tool fails to cut through both thicknesses. The total number of cuts should exceed 10.

f. Failure to make 10 cuts indicates maintenance is required.

Cleaning

Clean the pneumatic rescue hand tool after every immersion in salt water. To clean, proceed as follows:

1. Rinse the hand tool thoroughly in fresh water (preferably distilled) and air dry, using a forced warm air source.

2. After cleaning the hand tool, lightly coat the cutting edge of the blade with pneumatic grease.